SYNTHESIS OF THERMALLY REDUCED GRAPHENE OXIDE AND ITS APPLICATION FOR UREA BIOSENSOR WITH IMPROVED LONG-TERM STABILITY

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Urea biosensors have been introduced to various fields, such as medicine, food quality control, environmental protection, pharmaceutical and agricultural industry [1, 2]. However, effective biosensor fabrication requires immobilization of selective enzymes, which usually have low stability and short lifespan without immobilization. Therefore, the main goal remains to develop an active, layered material, which would not only have the exceptional electric qualities, but also would let to immobilize certain biocomponents, thus maintaining their stability [3]. One of the promising ways to accomplish such task is to integrate carbon materials, which are characterized by unique mechanical, electrical and thermal properties, into analytical systems [4].

Aiming to create stable urea biosensor, thermally reduced graphene oxide (TRGO) was synthesized. Initially, graphite oxide samples were prepared using Hummers' method and pre - washed 5, 8 and 13 days to reduce the excess of sulphate ions. Then the specimens were reduced using thermal reduction and fractionation equipment. Acquired TRGO fractions were analysed using x–ray diffraction and Brunauer–Emmett–Teller analysis. Activity and stability of the biosensors containing TRGO with different characteristics and urease was investigated. Urea biosensor possessing favourable stability was applied for urea monitoring in industrial technology of fertilizers.

References

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